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(54) A multi-flavour drink dispenser

(57) The dispenser is of modular design and comprises: a bottom plug assembly (2), a manifold assembly (5) and a spout assembly (7) each with product supply lines passing therethrough and connected together by push-in transfer plugs. The plug assembly (2) is provided with shut-off valves (14) and the manifold assembly (5) is provided with solenoid valves (6) for controlling the flow in each of the product lines. The dispenser is electronically controlled so that selected concentrates and diluents are supplied to a mixing nozzle (9) when the appropriate valves (5) are opened where they mix to form the required flavoured drink. The dispenser can be controlled in a number of modes, eg a dispensing mode and a Brix adjustment mode.

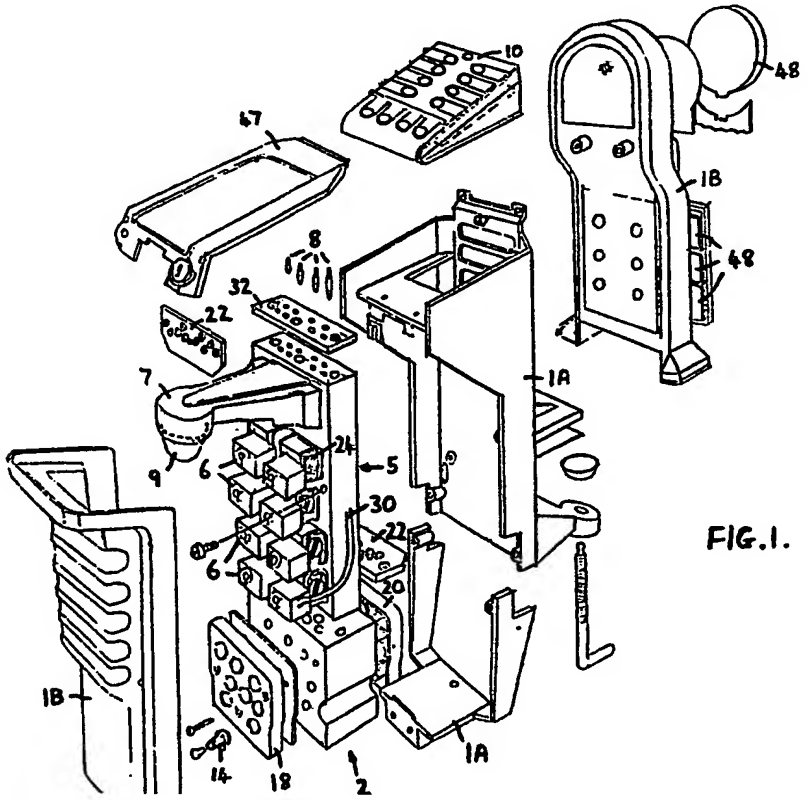

FIG.1.

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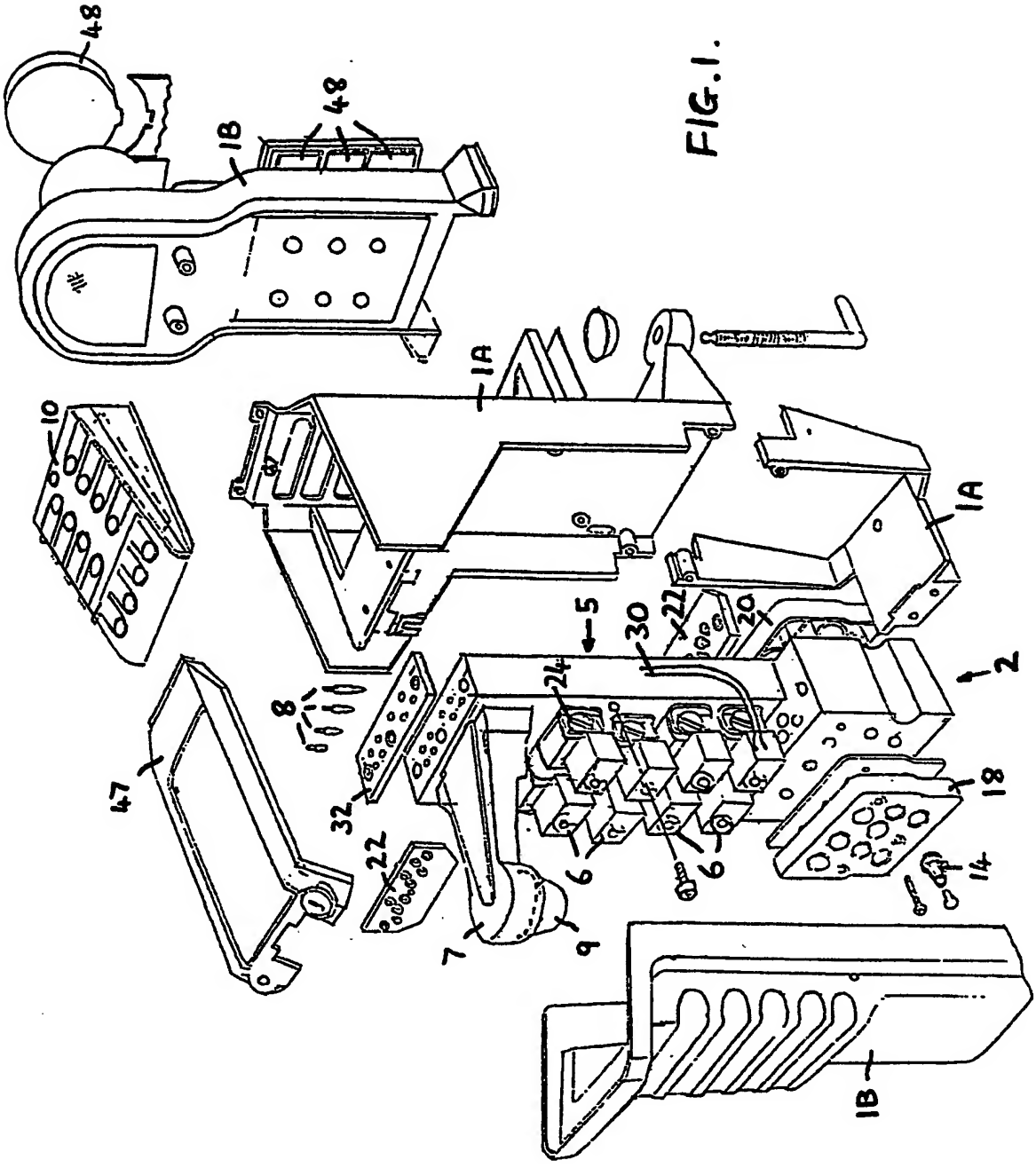

FIG. 1.

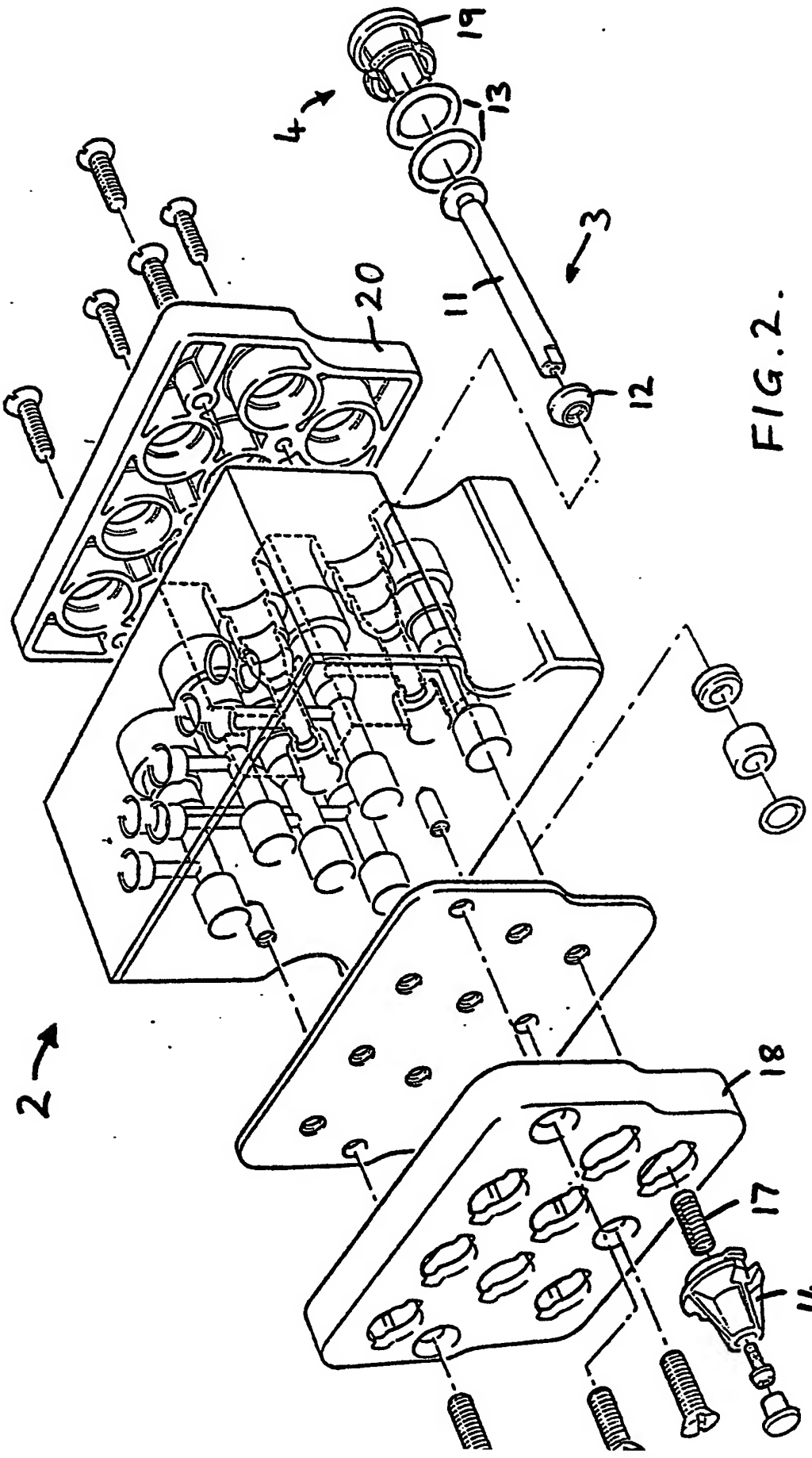

FIG. 2.

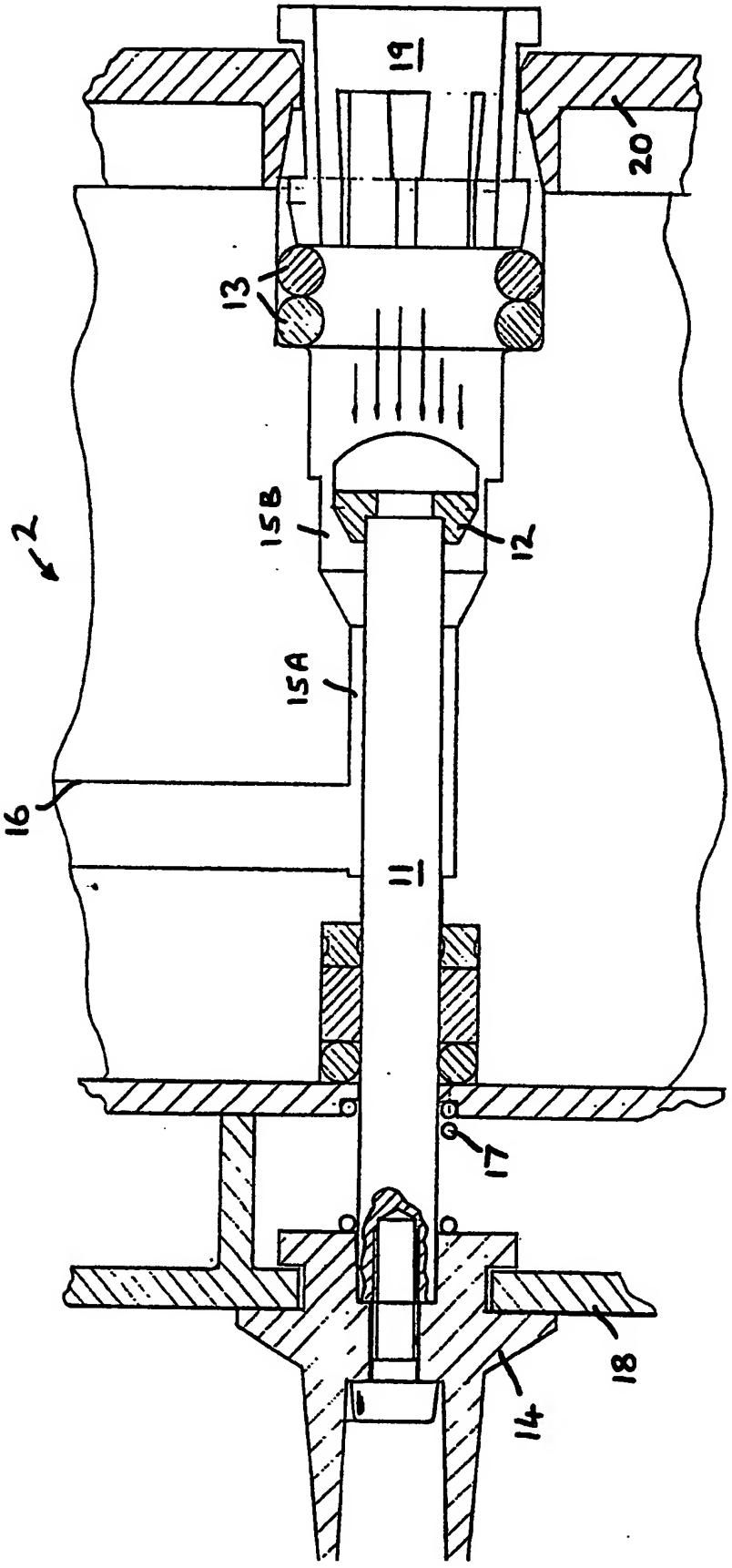

FIG.3

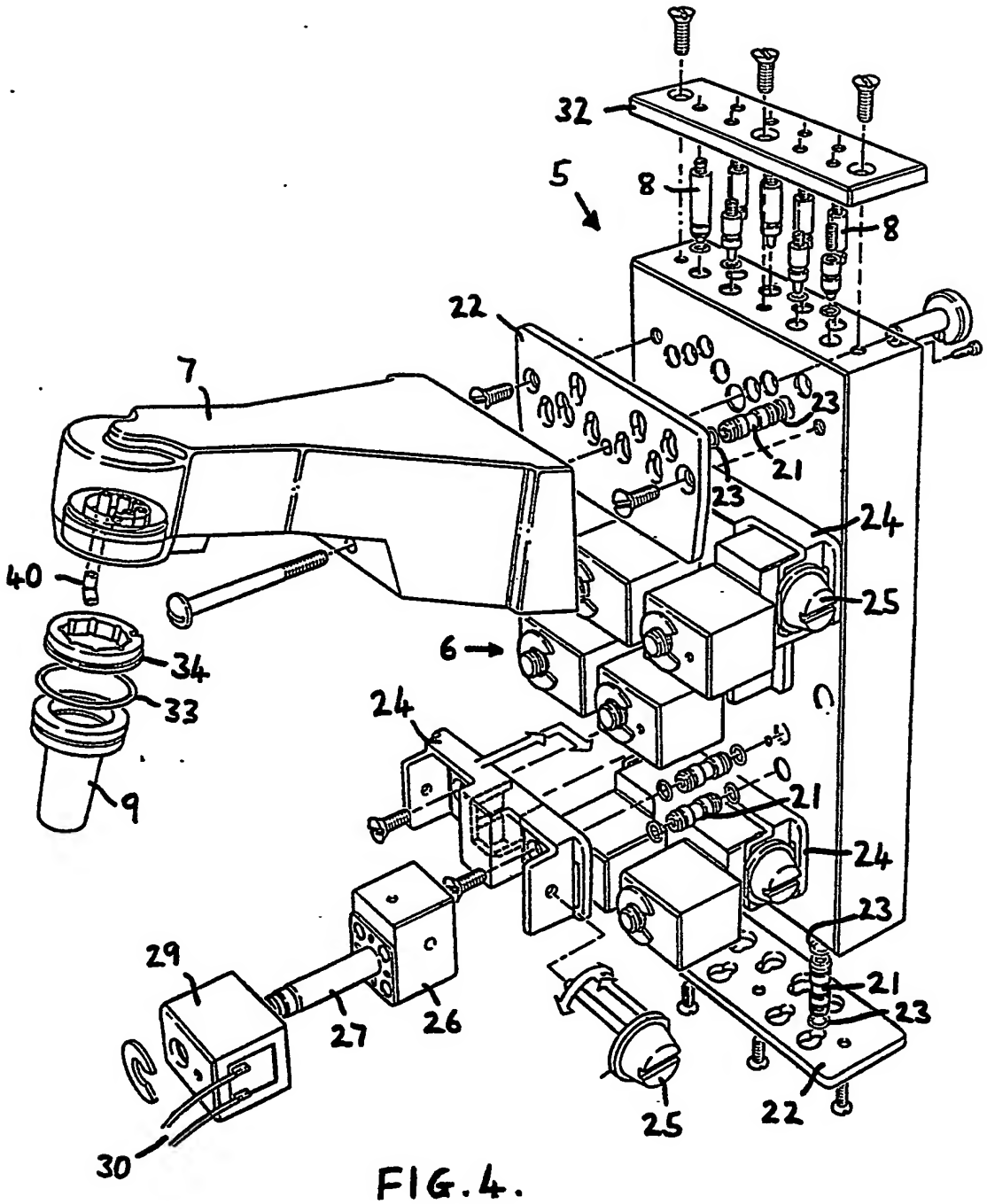
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FIG. 4.

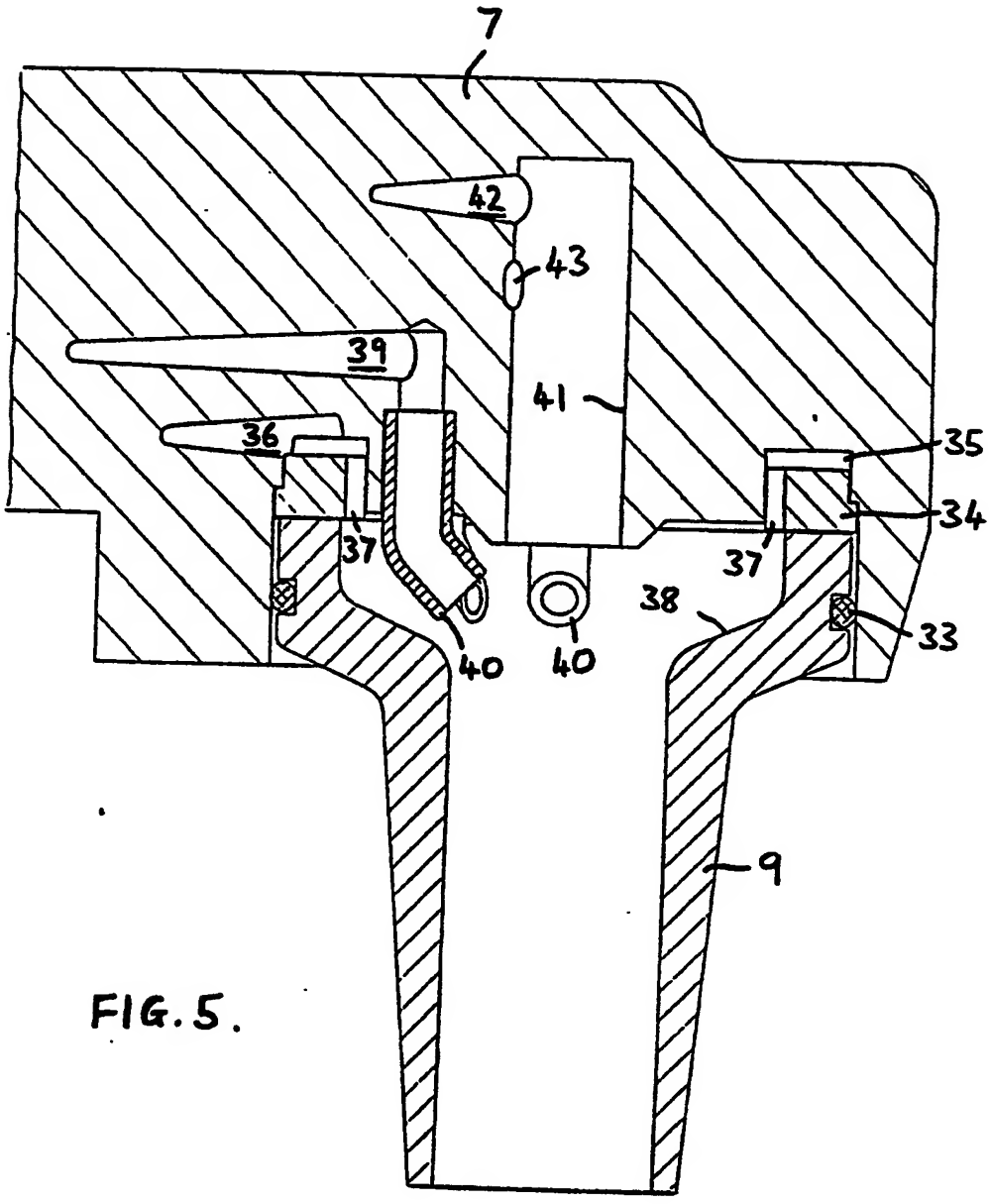

FIG. 5.

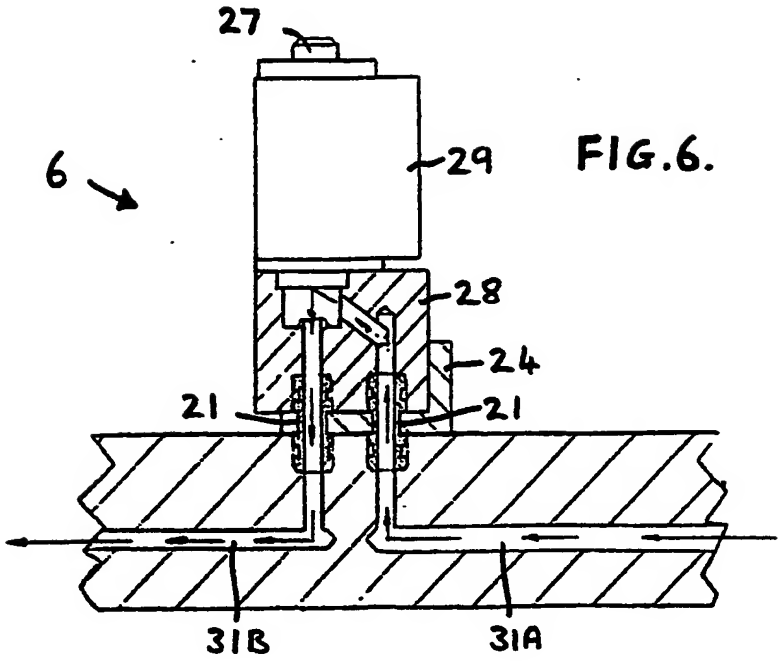
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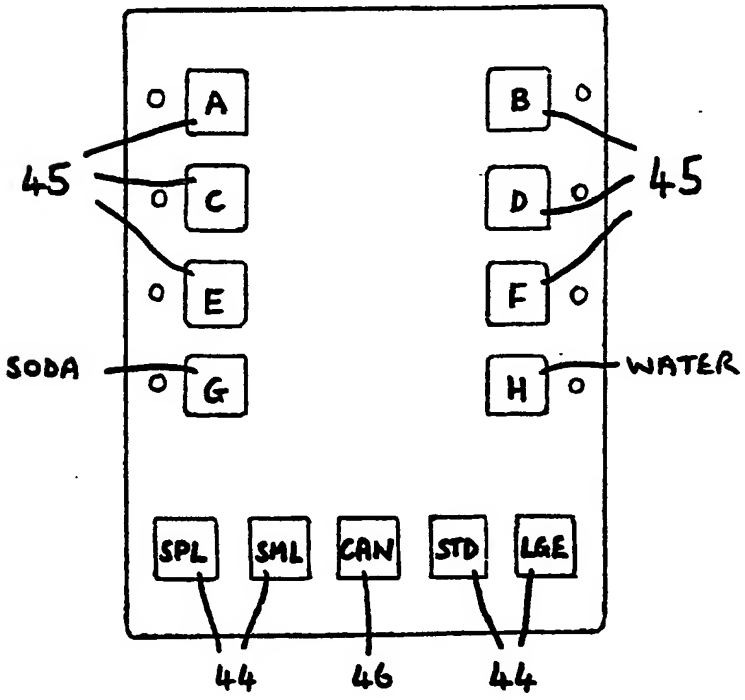
FIG.6.

FIG.7.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MULTI-FLAVOUR DRINK DISPENSER

This invention relates a multi-flavour drink dispenser designed to selectively mix and dispense a plurality of concentrates with one or more diluents.

Multi-flavour drink dispensers are designed to provide drinks comprising a mixture of diluent such as still water or carbonated water with selected concentrate or syrup of the required flavour. The most widely used form of dispenser is the gun type dispenser which comprises a hand held gun with on-off push buttons for selecting the required drink. A flexible connection comprising pipes for the diluent and concentrates is provided between the gun and a housing which may be mounted on a bar or other support. The housing, in turn, is connected to pressurized reservoirs of the diluent and concentrates. On pressing a given button on the gun, the appropriate diluent and concentrate are allowed to flow out of the nozzle of the gun into a glass or other container in which they mix to form the required drink.

The present invention seeks to provide a multi-flavour drink dispenser of more convenient and compact design.

According to the invention, there is provided a multi-flavour drink dispenser comprising: a plug assembly with a diluent line and a plurality of concentrate lines passing therethrough, each line having connection means for connecting to a product supply line and a shut-off valve for closing off the line; a manifold assembly with a diluent supply line and a plurality of concentrate lines detachably connected to the corresponding lines of the plug assembly and valve means detachably connected to the diluent line and to one or more of the concentrate lines for switching on and off the flow therein; and a spout assembly with a diluent line and a plurality of concentrate lines detachably connected to the corresponding lines of the manifold assembly and leading to a mixing nozzle from which drinks are dispensed, the manifold assembly being detachably mounted within a housing provided with means for detachably securing the dispenser to a bar or counter.

Preferred features of the invention will be apparent from the following description and the subsidiary claims of the specification.

Attention is drawn to co-pending applications numbers ..... (publication numbers .....) directed towards other features of the drink dispenser described herein.

The invention will now be further described, merely by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is an exploded perspective view of the main components of a an embodiment of a multi-flavour drink dispenser according to the invention;

Figures 2 is an enlarged, exploded view of a bottom plug assembly forming part of the dispenser shown in Figure 1;

Figure 3 is a cross-sectional view of part of the bottom plug assembly shown in Figure 2;

Figure 4 is an enlarged, exploded view of a manifold assembly forming part of the dispenser shown in Figure 1;

Figure 5 is an enlarged, cross-sectional view of a pouring spout forming part of the dispenser shown in Figure 1,

Figure 6 is an enlarged, cross-sectional view of a part of the manifold assembly shown in Figure 4, and

Figure 7 shows the key pad of a control panel forming part of the dispenser shown in Figure 1.

The illustrated dispenser can be used to dispense up to six different flavour soft drinks of which five may be carbonated and one still, eg a natural juice. Soda (carbonated water) and water may also be dispensed separately. The drinks are all dispensed through a single nozzle and mixing of the drink occurs in the nozzle rather than the cup into which it is poured so providing a superior presentation of the drinks than in known dispensers. It is also possible to dispense drink made up of more than two components, eg non-alcoholic beer which comprises a flavoured syrup, soda water and still water.

The dispenser is a complete unit needing only connection to an electrical power source and to pressurized reservoirs of the various concentrates and diluents to operate. The dispenser comprises a body 1A adapted to be clamped to a bar or counter (not shown). Product entry pipes (not shown) conveying the concentrates and diluents enter horizontally from beneath the bar to the rear of a bottom plug assembly 2 provided at the base of the dispenser. The plug assembly 2 is provided with shut-off valves 3 and push-fit connections 4 to permit rapid and easy connection and disconnection of the product entry pipes.

The products are supplied under pressure to the dispenser which supplies the required quantities of these products and mixes them together to form the different drinks. If the drinks are to be cooled, this is effected by cooling the products in their reservoirs or in the product lines leading to the dispenser.

Passageways within the bottom plug assembly 2 turn the concentrates and diluents through 90 degrees so they pass vertically into a manifold block 5 positioned above the bottom plug assembly 2. In the manifold block 5, the flow of each of the concentrates and diluents through passageways formed therein is controlled by solenoid valves 6, one in each passageway. The solenoid valves 6 are, in turn, controlled by a microprocessor (not shown).

Towards the top of the manifold block 5, the passageways therein turn through 90 degrees towards a spout 7 attached to the front of the block 5. The top of the manifold block 5 is also provided with adjustment screws 8,

one for each passageway, for adjusting the flow rates of the diluent and concentrates and thus the proportions in which they are dispensed.

Passageways within the spout 7 convey the concentrates and diluents to a nozzle 9 in which they are mixed and from which the drinks are dispensed.

On the top of the body 1, a control panel 10 is provided for controlling the dispenser. This comprises a key-pad (see Figure 7) which permits the selection of the six different flavour drinks or water or soda on its own. The dispensing of a drink is electronically controlled by means of the microprocessor and the solenoid valves 6. For example, when the key for a fizzy orange drink is pressed, the solenoid valves 6 controlling the flow of carbonated water and orange concentrate are opened for a predetermined length of time to allow the water and concentrate to flow through the dispenser to the nozzle 9. The quantity of drink dispensed is determined mainly by the time for which the valves 6 are open and the relative volumes of concentrate and diluent dispensed (and hence the strength of the drink) are determined mainly by the setting of the adjustment screws 8. The orange concentrate and carbonated water thus flow from the respective reservoirs through the bottom plug assembly 2, manifold block 5 and spout 7 to the nozzle 9 where they are mixed and dispensed into a cup (not shown) positioned beneath the nozzle 9.

Outer casings 18 of the dispenser are also shown in Figure 1.

Various components of the dispenser will now be described in more detail with reference to the accompanying drawings:

Bottom Plug Assembly

The bottom plug assembly 2 is preferably made from a cast acrylic block machined to the desired shape and drilled to form horizontal and vertical passageways 15 and 16 through which the concentrates and diluents flow (see Figure 2).

The shut-off valves 3 comprise a pin 11, a shut-off seal 12 secured to one end of the pin 11 and a control knob 14. As shown in Figure 3, the pin 11

is located in a horizontal passageway 15 within the plug assembly 2 so the seal 12 is positioned adjacent a valve seat formed at the junction between a narrow portion 15A and a wider portion 15B of the passageway. The pin 11 can be moved axially within the passageway 15 by turning the control knob 14 through 90 degrees to move the seal 12 into and out of engagement with the valve seat thus opening and closing communication between the two portions 15a and 15B of the passageway. To open the shut-off valve 3, the knob 14 is pressed in and rotated through 90 degrees against the action of a spring 17 and the pressure of diluent or concentrate within the passageway 15. As shown, the knob 14 is located within a locking plate 18 which holds it in this position. To close the shut-off valve 3, the knob 14 is turned 90 degrees in the opposite direction and is thereby released from the locking plate 18 so it can move back under the action of the spring and the pressure within the passageway and the seal 12 is moved away from the valve seat.

The push-fit connections 4 comprises a collet 19 fitted within a cam plate 20 secured to the rear face of the plug assembly 2 and a pair of O-rings 13. The collet 19 receives a plastics product entry pipe by means of a conventional push-fit connection, the pipe being held within the collet 19 and the O-rings 13 providing a fluid-tight connection.

The vertical passageways 16 in the bottom plug assembly 2 are connected to passageways within the manifold block 5 by means of transfer plugs 21. Similar transfer plugs 21 are provided between the other components of the dispenser, eg between the manifold block 5, and each solenoid valve 6 and between the manifold block 5 and the spout 7. As shown in Figure 4, each transfer plug 21 comprises a tube formed from a plastics moulding having external shoulders which engage holes in a retaining plate 22 which holds the plugs 21 in position. An O-ring 23 is provided on each end of the tube to provide fluid-tight connections with the respective components.

The bottom plug assembly 2 may be detached from the manifold block 5 by removing retainer screws (not shown) and simply pulling it away to disconnect the transfer plugs 21. Hence, by shutting off the product lines

by means of the valves 3 and removing the bottom plug assembly 2, the manifold block 5 can be accessed for maintenance or replacement.

Manifold Block

The manifold block 5 is also preferably formed from an acrylic block and has passageways formed therein to convey the concentrates and diluents from the bottom plug assembly 2 to the spout 7 via the solenoid valves 6. The solenoid valves 6 are mounted in pairs within cradles 24 secured to the manifold block 5. Each valve 6 is secured within a cradle 24 by a locking pin 25 which may be secured or released by simply rotating it through 90 degrees, eg with a screwdriver. This allows for easy removal of the valves 5 for maintenance or if the layout of the block 5 is to be changed (see below). The cradles 24 are also arranged to hold the transfer plugs 21 in position so, in this case, a separate retaining plate 22 is not required.

Figure 6 provides a cross-sectional view of the connection between a solenoid valve 6 and the passageways within the manifold block 5.

The solenoid valves 5 themselves comprise a solenoid block 26, a solenoid pin 27 which is moved axially into and out of a valve block 28 when the solenoid is activated and a cover 29 provided with the appropriate electrical connections 30 for the solenoid. This type of solenoid valve is preferred since it has a positive operation, is compact, easy to service, leak proof and has a low power consumption.

As shown in Figure 6, fluid flows from a first part 31A of a passageway within the manifold block 5 into the valve block 28 via a transfer plug 21. Flow from the valve block 28 back to a second part 31B of the passageway in the manifold block 5 is controlled by the position of the solenoid valve pin 27. When the valve 6 is not activated, the pin 27 projects into the valve block 28 and closes the passageway leading back to the manifold block 5. When the valve is activated, the pin 27 is lifted to allow flow from the valve block 28 through another transfer plug 21 to the second part 31B of the passageway in the manifold block 5.

At the top of the manifold block 5, the adjustment screws 8 project into the passageways within the block adjacent to the position where these turn through 90 degrees towards the spout 7. Each adjustment screw 8 has a conical tip which is located within a fluid passageway to restrict the flow in a conventional manner depending on the position of the adjustment screw 8. Adjustment of the screws 8 adjusts the relative flow within the passageways and thus provides the 'Brix' adjustment which determines the proportions of concentrate and diluent which are mixed to form a drink. As shown in Figure 4, the adjustment screws 8 are preferably threaded into a metal plate 32 secured to the top of the manifold block 5 rather than directly into the block itself.

The manifold block is designed to be compact. For instance, the mounting of the solenoid valves 6 in pairs helps minimise the size of the block 5. Due to the compact layout, the manifold block 5 can be mounted vertically within the dispenser body 1 as shown in Figure 1. The direct connection of the bottom plug assembly 2 to the manifold block 5 also helps reduce the size of the dispenser.

The modular construction of the block 5 also enables the layout of the block to be altered according to the requirements of the dispenser. For instance, if the dispenser is only required to provide three flavours of fizzy drinks, only four solenoid valves 6 need be provided (one for each of the flavoured concentrates and one for the carbonated water). The unused lines can then be simply closed off.

Spout and Nozzle

The spout 7 is preferably formed from acrylic machined to the shape illustrated. It is mounted to the manifold block 5 so as to be inclined upwards by around 10 degrees so that concentrate and diluent remaining within the passageways therein after a drink has been dispensed do not drip from the nozzle 9. Figure 5 shows an enlarged cross-sectional view of the spout 7 and the nozzle 9. The nozzle 8 is a push-fit within the spout 7 and held in place by an O-ring 33 which is an interference fit within the spout 7. An annular insert 34 is also fitted into the spout 7 and is held in place by the nozzle 9. The insert 34 defines a gallery 35 within the

spout 7 which connects with a passageway 36 supplying carbonated water. Carbonated water passes from this gallery 35 through a series of drillways, eg ten fine orifices 37 , into a mixing chamber 38 formed in an upper portion of the nozzle 9. The carbonated water emerges from these orifices 37 to form a fine annular spray of carbonated water which is projected onto inclined walls of the mixing chamber 38 from where it is deflected into the centre of the mixing chamber 38 to form a column of liquid and spray passing down the nozzle 9.

Each of the passageways, such as passageway 39 shown in Figure 4, for the five concentrates to be mixed with the carbonated water leads to an outlet formed by a stainless steel tube 40. These are arranged inside the circle of the gallery 35 and are positioned so as to direct concentrate emerging therefrom into the stream of soda formed within the central portion of the mixing chamber 32.

This arrangement ensures that the soda water is maintained under pressure up to the point at which it is dispensed into the mixing chamber 38 so avoiding gas break-out within the passageways of the spout. The manner in which the soda and concentrate are directed into the mixing chamber also ensures effective mixing of the drink before it is dispensed from the nozzle 9.

The mixing and pouring requirement of a still drink are different from those of a fizzy drink as although there is no problem with gas breakout the mixing needs to be more aggressive. In view of this, a separate mixing chamber 41 is provided in the centre of the spout 7. An outlet 42 for the still water is provided at the top of this chamber 41 and an outlet 43 for natural juice concentrate is positioned below this. The natural juice concentrate and still water thus both emerge and mix together in the mixing chamber 41 before passing through the nozzle 9. The still water outlet 42 is entirely separate from the carbonated water outlets 37 so avoiding any problems of gas break-out between the two and also allowing both to be dispensed together, eg for drinks comprising three components such as the non-alcoholic beer mentioned above.

The main reason for the separate arrangement for the still drink is that since the water used is not carbonated and therefore unlikely to foam it would not, if dispensed through the orifices 37, form a complete column of liquid within the nozzle 9 and so would provide a poor presentation and poor mixing of the drink. By using the arrangement described, thorough mixing of the juice concentrate and the water can be achieved with a good columnar pour. Secondly, with the arrangement illustrated in which the water outlet 42 is positioned immediately above the concentrate outlet 43, the water flushes the outlet 43 of the natural juice concentrate and so prevents the build up of pulp deposits in this area which could otherwise lead to hygiene problems. As mentioned above, this arrangement also enables water and soda to be dispensed together.

In an alternative arrangement (not shown), the still drink mixing chamber 41 can be omitted and, if desired, a further stainless steel outlet provided in its place so that an additional flavour fizzy drink can be dispensed. Other arrangements known in the art for dispensing and mixing carbonated water and a concentrate within the nozzle may also be used.

Electronic Control

The solenoid valves 6 are controlled by the microprocessor under the operation of the key-pad shown in Figure 7). The dispenser can be operated in a number of modes which are described below. Mode select buttons (not shown) are provided to select the required mode.

Mode 1: Portion Control

In this mode, drinks are mixed and dispensed depending on which buttons are pressed. As shown in Figure 6, there may be four portion control buttons 44 for dispensing a splash (eg 1 fl.oz.), a small portion (eg 2 fl.oz.), a standard portion (eg 4 fl. oz.) and a large portion (eg 8 fl. oz.) respectively. The size of the portions is determined by the period of time for which the respective solenoids 6 are activated from between 1 and 25 seconds. Each size portion thus corresponds to a pre-set dispense time.

When a drink select button 45 is pressed, the quantity last set on the portion control buttons 44 is dispensed. The drink select button thus

simultaneously activates the relevant concentrate and diluent solenoids for the pre-set time to dispense this quantity of drink. In the arrangement shown, eight drink select buttons 45 are provided, five for the different flavour fizzy drinks (eg A-lemonade, B-cola, C-diet cola, D-fizzy orange and E-tonic water), one for the natural juice (eg F-orange juice) and two for dispensing the diluents on their own (eg G-soda and H-still water).

In this mode, the relevant portion control and drink buttons are illuminated (or illuminated more brightly than the other buttons) to indicate the option which has been selected. If a mistake is made, a cancel button 46 can be pressed to clear previous settings.

In an alternative arrangement, the dispenser may be pre-set to provide provide a single portion size so the means for selecting and/or adjusting portion size (see below) need not be provided.

A fault such as low pressure or lack of product may be detected by sensors (not shown) located in the product supply lines or reservoirs. The microprocessor is arranged to activate a warning light (not shown) and/or immobilize the relevant solenoid 6 on receipt of the appropriate signal from the detectors.

Mode 2: Freeflow

In this mode, soda or water may be dispensed for as long as the relevant button is pressed.

Mode 3: Brix Adjustment

Brix adjustment is conventionally carried out by holding a Brix cup comprising separate compartments for the different constituents of a drink under the nozzle when a drink is poured so the different components are collected in the respective compartments and their levels can be compared. With a typical drink dispenser, this requires a special device to separate the different constituents as they are dispensed. This becomes increasingly complex as the number of possible flavours is increased particularly with a spout having a complicated layout such as that described above. To solve

this problem, the dispenser described herein takes advantage of the electronic control to provide a special Brix adjustment mode.

In this mode, the screws 8 can be adjusted to set the flow rates of concentrates and diluents to the required levels. First of all, the dispenser is set in Mode 2 so that the flow rate of soda and water on free flow can be set to the optimum rate, eg to 4 fl.oz. per second. The dispenser is then switched to Mode 3. In this mode, the relevant concentrate or diluent is dispensed for a pre-set time period, eg four seconds, when a flavoured drink selection button or diluent buton is pressed. Thus, a four second burst of soda is first poured into the main compartment of a Brix cup. Then, a four second burst of, say, orange concentrate is poured into the relevant side compartment of the cup when the fizzy orange drink button is pressed. The respective compartments of the Brix cup are arranged in conventional manner so that the level of concentrate and the level of diluent in the compartments are equal when the Brix setting is correct. If the levels are not equal, one or more of the adjustment screws 8 is adjusted until, on repeating the exercise, equal levels are obtained in the concentrate and diluent compartments of the Brix cup. This is repeated for each of the five fizzy drink flavours and then for the still drink in which the levels of natural juice concentrate and still water are matched.

Alternatively, since the various constituents of the drinks are dispensed separately in this mode, a calibrated beaker may be used in place of a Brix cup. Flow rate and Brix adjustment can then be set together.

Mode 4: Learn Mode

In this mode, the duration of the dispense period for each of the portion settings controlled by the portion control buttons 44 may be set. Once the learn mode is selected, the relevant portion control button 44 is pressed and a drink select button 46 held down until the required quantity of drink has been dispensed. The microprocesser records the dispense time and uses the same time period when that size portion is selected in mode 1. In this mode, any lines which are not to be used can also be immobilized.

Mode 5: Purge Control

In this mode, product only is dispensed, ie concentrate or diluent, to clear a line when a reservoir tank or bag is changed.

The mode control buttons and all other controls and adjustments, except for the buttons shown in Figure 7, are concealed by a top cover 47 which can only be removed by release of a security lock with a key.

A further important feature of the electronic control is that when a drink comprising a mixture of concentrate and diluent is dispensed, the solenoid controlling the flow of concentrate is closed a short time, eg 0.1 to 0.5 seconds and preferably 0.2 seconds, before the solenoid controlling the flow of diluent is closed at the end of the dispensing of a drink.

By this means, the nozzle 9, and particularly the walls of the mixing chamber 38, are effectively flushed by soda at the end of each dispense to remove any traces of concentrate remaining therein. When a still drink is dispensed, the mixing chamber 41 and nozzle 9 are similarly flushed by a short flow of water after the flow of juice concentrate has been shut-off. The passage of soda or water after the flow of concentrate has ceased also acts to suck out any concentrate remaining in the tubes 40 or the outlet 43.

This feature helps keep the mixing chambers 38 and 41 and the nozzle 9 clean and hygienic. It also helps avoid contamination of a drink with the concentrate used in the drink previously dispensed. It will be appreciated that this is particularly important in a dispenser capable of dispensing several different flavour drinks especially when a residue of one concentrate, eg for a cola drink, which has a dark colour could stain a clear drink such as lemonade or soda.

A flush of about 0.2 seconds is sufficient to clear traces of the concentrate from the nozzle without unduly disturbing the Brix setting even when a small portion of drink is selected.

The flushing occurs automatically for all flavoured drinks. In the past, with the gun-type dispensers mentioned above, the only solution was to physically wipe the nozzle or for the operator to manually select soda or water to flush the nozzle clean between drinks. This could easily be forgotten and wasted the soda or water used in this way.

The dispenser described above is particularly suited for use on a drinks bar or counter, eg of a public house. It is designed to occupy a space similar to that taken up by existing twin dispensers but at the same time dispense up to six different flavour drinks and provide illuminated point-of-sale advertising for each of the different drinks that may be dispensed. The dispenser is also arranged so that the key-pad and lenses 48 used to indicate the brands available are easily replaceable so they can be changed if requirements alter.

CLAIMS

1. A multi-flavour drink dispenser comprising: a plug assembly with a diluent line and a plurality of concentrate lines passing therethrough, each line having connection means for connecting to a product supply line and a shut-off valve for closing off the line; a manifold assembly with a diluent supply line and a plurality of concentrate lines detachably connected to the corresponding lines of the plug assembly and valve means detachably connected to the diluent line and to one or more of the concentrate lines for switching on and off the flow therein; and a spout assembly with a diluent line and a plurality of concentrate lines detachably connected to the corresponding lines of the manifold assembly and leading to a mixing nozzle from which drinks are dispensed, the manifold assembly being detachably mounted within a housing provided with means for detachably securing the dispenser to a bar or counter.

2. A drink dispenser as claimed in claim 1 in which connection between one or more of the plug assembly and manifold assembly, the valve means and the manifold assembly and the manifold assembly and the spout assembly is provided by a plurality of transfer plugs, each transfer plug comprising a tube with an O-ring at each end which is a push fit into the ends of the diluent and concentrate lines in the respective assemblies.

3. A drink dispenser as claimed in claim 1 or 2 in which the shut-off valves each comprise a seal movable into and out of engagement with a valve seat formed at the junction between a narrow portion and a wider portion ofthe line so as to open and close communication between those portions.

4. A drink dispenser as claimed in claim 1, 2 or 3 in which the connection means are adapted to receive the product supply lines by means of a push-fit connection.

5. A drink dispenser as claimed in any preceding claim in which the connection means are orientated so as to receive product supply lines entering horizontally from beneath the bar and the diluent and concentrate

lines in the plug assembly turn through 90 degrees to extend vertically towards the manifold assembly.

6. A drink dispenser as claimed in any preceding claim in which the manifold assembly comprises a manifold block with first and second portions of the diluent and concentrate lines passing therethrough and each of the valve means comprise a transfer block providing communication between the two portions of the respective line and movable means arranged to interrupt the flow through the respective transfer block.

7. A drink dispenser as claimed in claim 6 in which the valve means are detachably mounted in pairs within cradles secured to the manifold block.

8. A drink dispenser as claimed in any preceding claim in which the manifold assembly is provided with adjustment means, eg restrictor screws, in each of the diluent and concentrate lines for adjusting the flow rates therein.

9. A drink dispenser as claimed in any preceding claim comprising electronic control means mounted on the manifold block for controlling operation of the valve means.

10.A drink dispenser as claimed in any preceding claim comprising detachable display means for indicating the different flavours of drink that can be dispensed.

11.A multi-flavour drink dispenser substantially as hereinbefore described with reference to the accompanying drawings.